



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER OF PATENTS AND TRADEMARKS  
Washington, D.C. 20231  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/586,736	06/05/2000	Yezdi Dordi	4256	7891

7590

07/17/2002

Patent Counsel  
Legal Affairs Dept  
Applied Materials Inc  
PO Box 450A  
Santa Clara, CA 95052

EXAMINER

LEADER, WILLIAM T

ART UNIT

PAPER NUMBER

1741

5

DATE MAILED: 07/17/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

53

## Office Action Summary

Application No.

09/586,736

Applicant(s)

Dordi

Examiner

William Leader

Group Art Unit

1741

—The MAILING DATE of this communication appears on the cover sheet beneath the correspondence address—

### Period for Response

A SHORTENED STATUTORY PERIOD FOR RESPONSE IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a response be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for response specified above is less than thirty (30) days, a response within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for response is specified above, such period shall, by default, expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to respond within the set or extended period for response will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

### Status

- ☒ Responsive to communication(s) filed on 10/30/01.
- ☐ This action is **FINAL**.
- ☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

### Disposition of Claims

- ☒ Claim(s) 1-8 and 18-26 is/are pending in the application.
  - Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- ☒ Claim(s) 1-8 and 18-26 is/are rejected.
- ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- ☐ Claim(s) \_\_\_\_\_ are subject to restriction or election requirement.

### Application Papers

- ☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.
- ☐ The proposed drawing correction, filed on \_\_\_\_\_ is ☐ approved ☐ disapproved.
- ☐ The drawing(s) filed on \_\_\_\_\_ is/are objected to by the Examiner.
- ☐ The specification is objected to by the Examiner.
- ☐ The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. § 119 (a)-(d)

- ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
  - ☐ All ☐ Some\* ☐ None of the CERTIFIED copies of the priority documents have been received.
  - ☐ received in Application No. (Series Code/Serial Number) \_\_\_\_\_.
  - ☐ received in this national stage application from the International Bureau (PCT Rule 1.7.2(a)).

\*Certified copies not received: \_\_\_\_\_.

### Attachment(s)

- ☒ Information Disclosure Statement(s), PTO-1449, Paper No(s). 3
- ☒ Notice of References Cited, PTO-892
- ☐ Notice of Draftsperson's Patent Drawing Review, PTO-948
- ☐ Interview Summary, PTO-413
- ☐ Notice of Informal Patent Application, PTO-152
- ☐ Other \_\_\_\_\_

Office Action Summary

Art Unit: 1741

Receipt of applicant's response filed with a certificate of mailing dated October 30, 2001, is acknowledged. Claims 9-17 have been canceled. Claims 1-8 and newly presented claims 18-26 are pending.

The proposed drawing amendments are approved.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-7, 18-23, 25 and 26 are rejected under 35 U.S.C. 102(b) as being anticipated by Reed (4,828,654).

The Reed patent is directed to apparatus for electroplating which utilizes a

Art Unit: 1741

segmented anode array. As shown in figure 1, an electrical source is coupled to each of the anode segments as recited in instant claim 1. Figures 2 and 3 show that the anode segments may have substantially coplanar upper segment surfaces as recited in instant claim 2. As shown in figure 3, the anode segments may be annular and may be aligned with a common axis as recited in instant claim 3. As shown in figure 2, two sets of anodes may be provided, one on each side of the workpiece to be plated. Each of these sets are aligned with different vertical axis, meeting the limitation of claim instant 4. Insulating members 36 are provided to connect adjacent segments together as recited in instant claim 5. See figure 4, lines 16-20. Reed teaches that anodes may be made from phosphorized copper (column 1, lines 41-45) meeting the limitation of instant claim 6. As shown in figure 2, each one of the anode segments is closer to a distinct portion of the cathodic workpiece than the rest of the cathode as recited in instant claim 7. As shown in figure 2, segments 34 to the left and right of the workpiece have substantially coplanar lower segment surfaces as recited in instant claim 18. Reed teaches that support member 36 is preferably formed of plastic to achieve an electrical insulating effect between the anode segments. Since the segments are electrically insulated, the current between adjacent segments would be limited such that each segment can be individually biased to a separate potential as recited in instant claim 19. As shown in figure 3, at least one of the segments is rectangular as in instant claim 20.

Art Unit: 1741

Figure 3 shows that the anode segments are fastened by machine screws 38. Removal of the screws would allow the anode segments to be repositioned as in instant claim 21. Insulating support members 36 may be considered to be anode supports. Members 36 are mounted to flanges on housing 12 which may be considered to be an anode base as recited in instant claim 22. Controller 62 is utilized to establish electroplating current as in instant claim 23. Insulating support members 36 are connected to anode segments as recited in instant claim 25. The anode segments are maintained fixed in position relative to the anode base as recited in instant claim 26.

Claims 8 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Reed in view of the admitted prior art.

Reed is taken as above. The admitted prior art is that found on pages 1-4 of the specification under the heading "Description of the Background Art" and shows that it is known to electroplate copper onto a semiconductor wafer and to surround the anode with a hydrophilic membrane to filter anode sludge. Reed teaches that the anode segments can be arranged in a variety of different predetermined patterns and shapes other than those shown (column 6, lines 30-32). Reed also disclose of a porous material separating the anode segments and the workpiece to filter anode fines (column 4, lines 56-59), but does not specify that the filter is made

Art Unit: 1741

of a hydrophilic membrane. The prior art of record is indicative of the level of skill of one of ordinary skill in the art. It would have been obvious at the time the invention was made to have formed anode segments in form of a cylinder as recited in instant claim 8 because Reed teaches that a variety of shapes may be used and the admitted prior art shows the use of a cylindrical anode to electroplate a circular semiconductor. It would have been obvious at the time the invention was made to have included a hydrophilic membrane as recited in instant claim 24 because a hydrophilic membrane is taught to be useful in filtering anode sludge by the admitted prior art.

Claims 1-5, 7, 18-23, 25 and 26 are rejected under 35 U.S.C. 102(b) as being anticipated by Bhatt et al (5,156,730)).

The Bhatt et al patent is directed to apparatus for electroplating which utilizes a segmented anode array. Means are provided for electrically biasing each of the segments individually and for controlling the quantity of current to each segment individually (column 1, lines 50-53). Thus, an electrical source is coupled to each of the segments as recited in instant claim 1. Bhatt et al teaches that the individual segments can be arranged horizontally and/or vertically. This disclosure along with figure 1 and 2 teach that the anode segments may have substantially coplanar upper segment surfaces as recited in instant claim 2. As shown in figure

Art Unit: 1741

2, anode segments are provided on each side of the part to be plated. At least two of the segments are aligned with a common axis as recited in instant claim 3 while at least two are not aligned with a common axis as recited in instant claim 4. The anode segments are supported on an insulating rack 7 (column 3, lines 27-28) as recited in instant claim 5. As shown in figures 1 and 2, each one of the anode segments is closer to a distinct portion of the cathodic workpiece than the rest of the cathode as recited in instant claim 7. The segments to the left and right of the workpiece have substantially coplanar lower segment surfaces as recited in instant claim 18. Bhatt et al teach that support member 7 is made of an insulating material. Since the segments are electrically insulated, the current between adjacent segments would be limited such that each segment can be individually biased to a separate potential as recited in instant claim 19. As shown in figure 1, at least one of the segments is rectangular as in instant claim 20. Figure 2 shows that the anode segments are fastened by hex nuts 5 and screws 6. Removal of the screws would allow the anode segments to be repositioned as in instant claim 21. Insulating support member 7 may be considered to be anode supports. Members 36 are mounted to the base of the housing which may be considered to be an anode base as recited in instant claim 22. A programmable controller may be utilized to establish electroplating current (column 4, lines 3-7) as in instant claim 23. Insulating support members 7 are connected to anode segments as recited in

Art Unit: 1741

instant claim 25. The anode segments are maintained fixed in position relative to the anode base as recited in instant claim 26.

Claims 6, 8 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bhatt et al in view of the admitted prior art.

Bhatt et al is taken as above. Again, the admitted prior art is that found on pages 1-4 of the specification under the heading "Description of the Background Art" and shows that it is known to electroplate copper onto a semiconductor wafer and to surround the anode with a hydrophilic membrane to filter anode sludge. The admitted prior art also shows that the use of soluble copper as the anode material is known. As noted above, Bhatt et al teaches that the anode segments can be arranged in different positions. Bhatt et al also teaches that the anode is preferably made from a non-consumable material (column 2, lines 53-55) which indicates that a consumable material could be used in a non-preferred embodiment. The prior art of record is indicative of the level of skill of one of ordinary skill in the art. It would have been obvious at the time the invention was made to have utilized copper as the material of the anode segments as recited in instant claim 6 because Bhatt et al recognizes that consumable material may be used, even if in a non-preferred embodiment, and the admitted prior art shows that copper is a desirable anode material in processes for depositing copper. It would have been obvious at



Art Unit: 1741

the time the invention was made to have included a hydrophilic membrane as recited in instant claim 24 when using a soluble anode material such as copper because a hydrophilic membrane is taught to be useful in filtering anode sludge by the admitted prior art. It would have been obvious at the time the invention was made to have formed anode segments in form of a cylinder as recited in instant claim 8 because Bhatt et al teaches that different arrangements of anode segments may be used and the admitted prior art shows the use of a cylindrical anode to electroplate a circular semiconductor.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. May et al (5,322,614) discloses the use of a plurality of anode segments separately wired and separated by insulating segments. Kubo et al discloses the use of a plurality of individually powered anode segments.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William Leader, whose telephone number is (703) 308-2530. The examiner can normally be reached Mondays-Thursdays and every other Friday from 7:30 AM to 4:00 PM eastern time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached at (703) 308-3322. The fax phone number for *official* after final faxes is (703) 872-9311. The fax phone number for all other *official* faxes is (703) 872-9310. Unofficial communications to the Examiner should be faxed to (703) 305-7719.

Serial Number: 09/586,736

-9-

Art Unit: 1741

Any inquiry of a general nature or relating to the status of this application should be directed to the receptionist whose telephone number is (703) 308-0661.

WL

William Leader:wtl  
July 15, 2002



DONALD R. VALENTINE  
PRIMARY EXAMINER

GROUP 1400 1741